WHAT IS CLAIMED IS:

1. A method for producing a prosthesis, the method comprising at least partially cutting a material segment with a beam wherein the cutting is controlled by a process control unit to cut the material to correspond to a target image.

2. The method of claim 1 wherein the pattern is determined according to a preselected template.

3. The method of claim 1 wherein the material segment comprises a tissue segment separated from an organism.

4. The method of claim 3 wherein the tissue segment comprises a tissue sheet.

5. The method of claim 1 wherein the material segment comprises a polymer.

6. The method of claim 1 wherein the target image has a leaflet section.

7. The method of claim 1 wherein the target image is determined by

a) forming a digital image of the material segment;

b) comparing the digital image to a target image to evaluate the difference between the digital image and the target image; and

c) determining a cutting pattern based on the difference.

8. The method of claim 7 wherein the digital image is formed using a video camera.

9. The method of claim 7 wherein the digital image is formed by a scanning phase measurement.

10. The method of claim 7 wherein determining the cutting pattern involves forming the cutting pattern

based on the border between the digital image and the target image.

11. The method of claim 7 wherein the cutting pattern is selected to avoid cutting any material that forms a portion of the target object.

12. The method of claim 7 further comprising orienting the digital image relative to the target image prior to comparing the digital image with the target image.

13. The method of claim 1 wherein the beam comprises a laser beam, and wherein the laser beam passes through frequency shifting optics.

14. The method of claim 1 wherein the beam comprises infrared laser light.

15. The method of claim 1 wherein the beam comprises visible laser light.

16. The method of claim 1 wherein the beam comprises ultraviolet laser light.

17. The method of claim 1 wherein the beam comprises a fluid.

18. The method of claim 1 wherein the cutting comprises moving beam directing optics to an appropriate location to direct the beam to the selected position on the material segment.

19. The method of claim 1 wherein the cutting comprises moving a support platform supporting the material to direct the light to a selected portion of the tissue.

20. The method of claim 1 wherein the at least partially cutting comprises partially cutting the material segment.

21. The method of claim 1 wherein the at least partially cutting comprises complete cutting of the material segment.

22. The method of claim 1 wherein the process control unit comprises a digital processor.

23. The method of claim 1 further comprising assembling cut components to form a prosthesis.

24. An apparatus for cutting a tissue segment, the apparatus comprising:

a) a tissue segment;

b) a support platform supporting the tissue segment;

c) a beam generator oriented to direct a beam at the tissue segment; and

d) a process control unit that controls the relative position of the support platform and the beam.

25. The apparatus of claim 24 further comprising a motor that changes the relative position of the support platform and the beam.

26. The apparatus of claim 25 wherein the process control unit actuates the motor to adjust the relative position of the support platform and the beam.

27. The apparatus of claim 25 wherein the motor is operably connected to the support platform to move the support platform relative to the beam.

28. The apparatus of claim 25 wherein the process control unit comprises a digital processor operably connected to the motor, wherein the processor controls the motor based on a target image.

29. The apparatus of claim 25 wherein the process control unit comprises a manual control that controls the actuation of the motor.

30. The apparatus of claim 24 wherein the support platform comprises a flat surface contacting the tissue.

31. The apparatus of claim 24 wherein the support platform comprises a mandrel supporting the tissue segment.

32. The apparatus of claim 31 wherein the mandrel is cylindrical or tapered.

33. The apparatus of claim 24 further comprising optical elements within the beam generated by the beam source to redirect the beam, and wherein the process control unit is operably connected to the optical components to move the optical components relative to the support platform.

34. The apparatus of claim 24 wherein the support platform comprises a fluidized bed.

35. The apparatus of claim 24 wherein the support platform comprises a vacuum fixture.

36. The apparatus of claim 24 further comprising a imaging device comprising a detector, wherein the imaging device is connected to the process control unit to form a digital image of the tissue segment.

37. The apparatus of claim 36 wherein the imaging device comprises a digital video camera.

38. The apparatus of claim 24 wherein the tissue segment comprises a heart valve explant with intact leaflets.

39. The apparatus of claim 24 wherein the tissue segment comprises a tissue sheet.

40. The apparatus of claim 39 wherein the tissue sheet has a film of water covering the tissue.

41. The apparatus of claim 24 wherein the beam source comprises a laser.

42. The apparatus of claim 24 further comprising beam directing optics mounted on a motorized stand, such that movement of the motorized stand alters the position of the beam on the tissue segment.

43. The apparatus of claim 24 wherein the beam source comprises a fluid jet.

44. The apparatus of claim 24 further comprising a humidity control to maintain high humidity in the environment surrounding the tissue.

45. A heart valve prosthesis comprising a tissue segment separated from the host, the tissue having a cauterized edge.

46. A method of cutting a tissue sheet to remove portions of the tissue sheet having different thicknesses, the method comprising:

imaging the tissue sheet on a smooth surface to evaluate the thickness of the tissue sheet at different points; and

cutting the tissue sheet to separate portions of the tissue sheet with a thickness outside of a selected range.

47. The method of claim 46 wherein the tissue sheet is mounted on a flat support platform that serves as a calibration reference point.

48. The method of claim 46 wherein the tissue sheet is mounted on a mandrel.

49. The method of claim 46 wherein the imaging is performed with a laser and a detector.